

On the Land-Molluscan Genus *Durgella*, W. T. Blanford; with Notes on its Anatomy and Description of a new Species. By Lieut.-Colonel H. H. GODWIN-AUSTEN, F.R.S., F.L.S.

[Read December 16, 1880.]

(PLATES XX. & XXI.)

THE genus *Durgella* was founded by Mr. W. T. Blanford in February 1863, in a paper published in the 'Annals and Magazine of Natural History'\*, which was really the first attempt to classify the Indian land-shells by the form of the animal; and in the section *Nanina* the form of the mucous pore at the extremity of the foot was principally relied on, together with the character of the shell. It placed several species in their correct natural divisions which were before unknown; and the localities are authentic, which renders the paper a valuable one as regards their distribution.

*Durgella* included three species:—

The type, *D. levicula*, Bens. Tenasserim (*Theobald*); Prome, in Pegu.

*D. mucosa*, W. & H. Blanf. Nilgiri Hills.

*D. seposita*, Bens. Darjiling. (Animal not seen by the author.)

The species *D. levicula* was described by Mr. W. H. Benson, in the 'Annals and Magazine of Natural History,' May 1859, p. 391, from a single specimen (which I take to be young) found at Phie-Thán, in Tenasserim, by Mr. W. Theobald. Benson's shells passed, some time after his death, to Mr. MacAndrew, and are now most of them in the Cambridge Museum and incorporated in the MacAndrew collection, and generally have "from Benson's collection" written on the new label, with India, Bengal, or Burmah as habitat; but I regretted to find Benson's original labels, in his unmistakable writing, have been destroyed, and with them all his valuable record of exact locality: this fault, however, does not rest, I am glad to say, on the Cambridge Museum. The original value of many of the species is gone for ever; and a good many have now no locality at all. There are two specimens of *D. levicula* in the collection from Tenasserim, one of which must be the type shell referred to. I have thus been enabled to compare and identify the specimens in my own collection; and I take this opportunity of thanking Mr. J. W. Clark, of Cambridge, for his courtesy in affording me every possible facility for examining this collection, which contains a very large number of type forms. The figure of

\* "On Indian Species of Land-Shells belonging to the Genera *Helix*, Linn., and *Nanina*, Gray" (Ann. & Mag. Nat. Hist. ser. 3, 1863, vol. xi. p. 81).

*D. levicula* in the 'Conch. Indica,' pl. xc. figs. 1-4, is a fair representation of the shell, but over-coloured.

Mr. Ossian Limborg collected in spirit a very large number of *D. levicula* on the slopes of the Mulé-it range near Meetan, and a number also reached me alive in Calcutta which had been packed in a bamboo-tube. An examination of the animal shows that it is a very distinct genus, having but a distant relationship with *Girasia*, *Macrochlamys*, &c., and must be placed in a distinct group of its own. It will be interesting hereafter to see in which direction and to what extent its allied forms will be found to range, the extreme limits now being Assam on the N.W. and Tenasserim on the S.E.; for among a collection of land-shells, in spirit, most kindly got together by Mr. D. McTavish Lumsden at the tea-factory of Paniputer, near Tezpur, in Assam, during the last rainy season, were two specimens I at first sight thought belonged to *Macrochlamys*. On taking them up for examination, I found all the interesting characters again as exhibited in *D. levicula*; and I hope to be able to point these out in some degree of detail in the following notes.

I am very doubtful if *mucosa* can be placed in this genus: *seposita* may be, perhaps; but if, as Mr. G. Nevill thinks, *seposita* is the same as my *bilineata* from the Dafla Hills, then it must also be removed; for the latter is a true *Macrochlamys*.

It is not improbable that the large form *Helicarion præstans*, Gould, from Moulmein and other parts of Tenasserim, will find a place in or near this genus, judging from a figure of the animal which was made under the superintendence of Ferd. Stoliczka; and I wish I could obtain the species in spirit.

*The Additional and Principal Characters of the Genus Durgella.*

1. The right and left mantle-lobes moderate, the shell-lobes very ample; the right shell-lobe extends from the anal aperture (close to the upper angle of the shell-aperture) to the columellar margin, and spreads away over the shell in a broad triangular tongue; the left shell-lobe is reflected slightly over the edge of the shell in front, from near the respiratory orifice, and becomes wider on the lower margin as it approaches the umbilicus, and is also of triangular shape when extended. A large portion of the shell is always exposed.

2. The mucous pore is well developed, with a large overhanging lobe.

3. The jaw is very thin, membranaceous, almost straight on the margin, with a very slight central projection.



4. The odontophore is broader than long, with a central minute, tricuspid tooth; the lateral teeth all similar, minutely 6-cuspid or pectiniform, on a curved edge, very closely set together and exceedingly numerous. 170—1—170+.

5. In generative organs, an amatorial organ present in the Burmese form is absent in the Indian.

6. *Shell* thin or membranaceous, globose or depressedly conoid; polished, very closely perforate, the columellar margin having no solidity.

The abnormality of this genus, as compared with shells of similar form, lies principally in the very remarkable odontophore, which is quite unlike any other Indian species of the Zonitidæ that I have examined; with this, of course, we find the jaw also much modified. There is considerable similarity with the teeth of *Conulema attegaia* and *C. infula* (figured by Stoliczka in the J. A. S. B. 1871, pl. xviii. figs. 4 & 9) in the multicuspid or pectiniform laterals and the greater number (153 on each side in *C. infula*); but the centre tooth is large and the shell-lobes of the mantle are not developed; still here we have relationship.

DURGELLA LEVICULA, Benson. (Plates XX. & XXI.)

*Locality.* Meetan, under the Mulé-it range, Tenasserim; very abundant (*O. Limborg*).

*Shell* very narrowly perforate, ovately globose. *Sculpture* smooth on last whorl, with regular shallow ribbing under a strong lens; the apical whorls are regularly and finely striate, crossed by oblique fine ribbing, and almost decussate. *Colour* when living pale greenish ochre, whitish towards the apex; with animal removed, very pale ochraceous. *Spire* low, convex. *Suture* rather shallow. *Whorls*  $3\frac{1}{2}$  to 4, adpressed, well rounded (Plate XX. fig. 7). *Aperture* broadly ovate, oblique. *Peristome* thin; columellar margin rounded, slightly reflected, not at all solid.

Large specimen :--

Size—major diam. 0·35, minor diam. 0·30, alt. axis 0·18 inch.

    "    "    9·0,    "    "    7·2,    "    "    4·5 millims.

Diam. aperture 5·7, alt. aperture 5·0 millims. The ordinary size, however, is 7·0 millims., of the major diameter.

*Living Animal.*—Pale ochre, with a dusky line on the upper part of the extremity of the foot, also on the neck; tentacles moderately long; foot with mucous gland (Pl. XX. fig. 3 a), lobe over it moderate. A broad tongue-like expansion (figs. 3, 4, & 6, *r.s.l.*) on the right side of the aperture, another on the left margin of the

mantle (*l.s.l.*), which is reflected over the edge of the peristome. Left neck-lobe (*l.d.l.*) moderate. The length of an animal with a shell 0·4 in major diam. was 0·75 inch.

The foot below has a distinct central area, the perambulatory portion; the margin of the foot regularly segmented, both on the outside and viewed from below.

*Generative Organs.*—Neither the ovotestes, hermaphrodite duct, nor albumen-gland have I been able to make out in the spirit-specimens.

The spermatheca (Pl. XXI. fig. 1) is short, thick and wide at the base, with a narrow neck above, and a swollen rounded terminal portion (vide *Conulema*, Stoliczka). The amatory organ large, being twisted in form from its position in the spire of the shell; at the anterior end it terminates in a well-developed, pointed, cylindrical knob, which is the homologue of the dart, and which is contained in a large expanded muscular sac.

The penis has an expanded portion below the point where the retractor muscle is attached; and in one specimen this was developed into a cæcum-like process, which probably represents the "Kalksac" in other forms; there is another convolution near and below the junction of the vas deferens.

The odontophore (Pl. XXI. figs. 3, 3*a*) is very broad, as described in the generic description; the central tooth is very minute, and so hidden by the larger laterals, that I have only been able to see it once. The lingual ribbon is extremely brittle, and generally parts upon the central line. It is very difficult to see the whole side of the odontophore at once and count the teeth; and I have not been able to count the number of rows, but they are considerably over a hundred. There must be at least 34,000 to 35,000 teeth. In *Conulema infula* Stoliczka records 30,000, in *C. attega* 40,000: their extreme minuteness is shown by four medians occupying only 0·0005 inch; five laterals the same space. The jaw (Pl. XXI. fig. 5) is 0·044 inch in length, very thin and membranaceous, nearly straight in front, with a very slight rise in the centre, convex above; muscular impressions striate from side to side, and arching sharply near the central portion; far less strongly formed than in *Macrochlamys* &c.

*DURGELLA ASSAMICA*, n. sp. (Plates XX. & XXI.)

*Locality.* Paniputer tea-garden, near Tezpur, Assam; only two specimens received (*Lumsden*).

*Shell* very thin and membranaceous, imperforate, depressedly conoid. *Sculpture* quite smooth, with some slight, indistinct, oblique shallow ribbing on the third whorl. *Colour* olive-brown.



*Spire* depressed. *Suture* impressed. *Whorls* 4, rather rapidly increasing (Pl. XX. fig 8). *Aperture* ovate, oblique. *Peristome* very thin; columellar margin not at all thickened.

Size—Major diam. 0·38, minor diam. 0·33, alt. axis 0·17 inch.

„ „ 9·5, „ „ 8·2, „ 4·4 millims.

*Animal*.—The overhanging lobe to the mucous pore is largely developed. The lateral pallial line is distinctly marked by a double row of oblong segmental divisions or tubercles (Pl. XX. fig. 5, *s, s*); but the portion of the foot above it is smooth, with indistinct radiating irregular lines leading to the dorsal side (*s\**).

In Pl. XX. fig. 6, I give the mantle-lobes detached from the body of the animal. They are as in *D. levicula*, only that the left dorsal lobe is divided into two distinct parts at about the middle of its length.

*Generative Organs* (Pl. XXI. fig. 2).—The albumen-gland is pear-shaped and well developed, with an expansion near the junction of the hermaphrodite duct. The oviduct is greatly swollen and enlarged, but, as usual, not well preserved. The spermatheca (*sp*) longer than in *D. levicula*, with the same swollen posterior termination and narrow median neck. The penis shows expanded portions in its course on both sides of the retractor muscle. *No amatorial organ* found in two specimens examined. Here we have a most interesting correspondence with what Stoliczka has recorded on the anatomy of *Conulema* (J. A. S. B. vol. xl. 1871, pp. 236–241, pl. xviii.), where he found it present in *C. attega*, Bens., from Burmah, not so in *C. infula*, Bens., the Bengal or Indian form. This I take to be another proof of the close relationship of the genus *Durgella* and *Conulema* in the two areas; for we find that *D. assamica* bears exactly the same relationship to *C. infula* as *D. levicula* does in Burmah and Tenasserim to *C. attega*—a modification from some older, earlier, and wider-distributed form having gone on in the two areas. But it would not, as Stoliczka says, be expedient, on this single point of structure alone, to place *attegia* and *infula* in different genera. On the contrary, it would be more in accordance with a strict classification to consider *Durgella* and *Conulema* as one, in spite of the very different and conchologically extreme form of their shells.

The odontophore (Pl. XXI. fig. 4) is as in *D. levicula*; the central tooth not seen. The jaw (Pl. XXI. fig. 6) very straight in front, thin, flatly convex above, rather narrow; the striate lines of muscular attachment form a broad arch over the central portion of the front edge,

List of Species of *Durgella*.*levicula*, Bens.*assamica*, Godw.-Aust.*seposita*, Bens. ? Anatomy not examined.*mucosa*, W. & H. Blanf. ? Anatomy not examined.*burmanica*, Bens. ? Anatomy not examined. I have very little doubt about this shell, which I examined in the Benson collection.*shisha*, Godw.-Aust. ? Anatomy not examined.

It would have been supposed, taking the shell-character alone, that *Helicarion Bensoni*, from the neighbourhood of Calcutta, would come into this list; but I have the lingual ribbon of this species from Mr. W. T. Blanford, and I find it similar to *Macrochlamys*. Similarly, taking the figures in Semper's 'Reis. Arch. Philipp.' pl. i. figs. 8 & 11, of *Helicarion bicarinatus* and *H. gutta*, the shells are very much like that of *D. levicula*; but they appear to have, besides the ordinary dentition, a different form of mucous pore and more complicate shell- and mantle-lobes. The same applies to *H. tigrinus* and *H. incertus*.

## EXPLANATION OF THE PLATES.

## PLATE XX.

Figs. 1 & 2. Shell of *Durgella levicula*, Bens.

3. Animal (spirit-specimen): *r.s.l.*, right shell-lobe (the dotted line shows where it spreads over the shell when the animal is alive); *a.o.*, anal orifice; *r.o.*, respiratory orifice; *r.ap.*, renal aperture; *r.d.l.*, right dorsal lobe; *l.d.l.*, left dorsal lobe; *s*, lateral line; *p*, the central pedal area.
- 3 *a.* Extremity of foot; lobe above the mucous pore, as in life.
4. *l.s.l.*, left shell-lobe; *l.d.l.*, left dorsal lobe.
5. Portion of side of foot of *D. assamica*, much magnified: *s*, *s*, divisions of the lateral line; *s\**, segmental lines running from it.
6. Diagrammatic view of the mantle-lobes of *D. assamica*: lettering as in fig. 3.
7. The sutural spiral of *D. levicula*.
8. The sutural spiral of *D. assamica*.

## PLATE XXI.

- Fig. 1. Generative organs of *D. levicula*: *P.*, penis; *r.m.p.*, retractor muscle of penis; *am.o.*, amatory organ; *r.m.*, retractor muscle; *v.d.*, vas deferens; *sp.*, spermatheca; *ov.*, oviduct.
2. Generative organs of *D. assamica*: *h.d.*, hermaphrodite duct; *al.g.*, albumen-gland; *ov.*, oviduct; *sp.*, spermatheca; *v.d.*, vas deferens
- P.*, penis; *r.m.p.*, retractor muscle of penis.
- 3, 3 *a.* Central laterals of *D. levicula*.
  - 4, 4 *a.* Central laterals of *D. assamica*.
  5. Jaw of *D. levicula*.
  6. Jaw of *D. assamica*.



Fig 1



Fig 2



Fig 3<sup>a</sup>



Fig 3

Fig 4

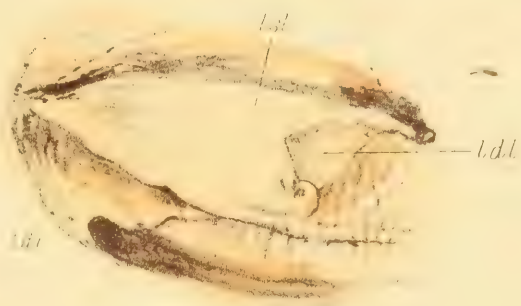
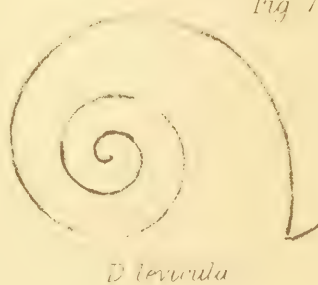


Fig 7



*D. levivula*

Fig 5

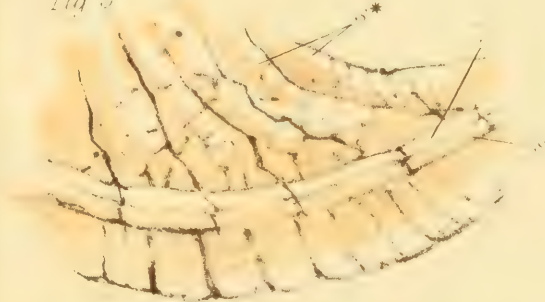
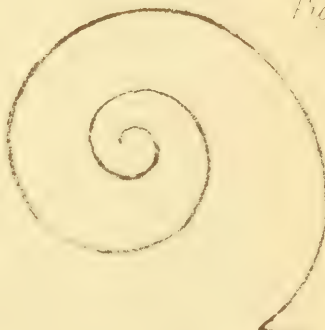


Fig 8



*D. assamwa*



Fig 6



Fig 2



Fig 1



Fig 3

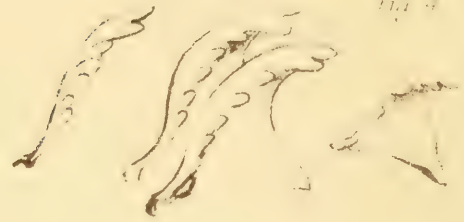


Fig 2<sup>a</sup>



Fig 2

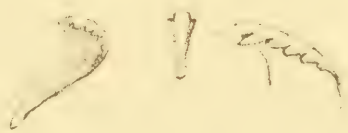


Fig 2<sup>b</sup>

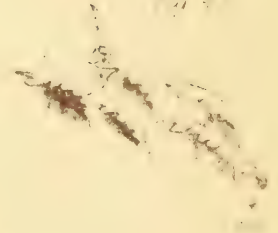


Fig 2

